



PATENT ABSTRACTS OF JAPAN

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(54) SEMICONDUCTOR DEVICE

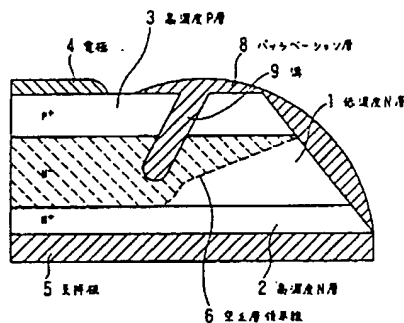
(57) Abstract:

PURPOSE: To eliminate the need for the increase of the width of a low concentration layer, and to reduce ON voltage and reverse recovery currents by forming a trench, which penetrates a P-N junction from the surface of a P layer and does not reach a high-concentration N layer, to the outer circumferential section of a substrate and also protecting the P-N junction exposed by a passivation material.

CONSTITUTION: A trench 9, which penetrates a P-N junction from the surface of a high-concentration P layer 3 and does not reach a high-concentration N layer, is shaped to the outer circumferential section of a substrate, and the P-N junction exposed to the inner surface of the trench 9 is also protected by a passivation material 8. Consequently, since the P-N junction between a low-concentration N layer 1 and the high-concentration P layer 3 in the layer 1 is interrupted by

the trench 9 cut from the surface of the P layer, the spreading of a depletion layer to the outside from the trench is limited, and the region 6 of the depletion layer in the side face of the substrate is separated from the interface with a high-concentration N layer 2 and there is no possibility in which the region 6 does not exceed the interface. Accordingly, reverse voltage can be applied until avalanche breakdown is generated in the substrate.

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